9. (New) A method for designing a nuclear fuel assembly which is intended to be positioned in a nuclear reactor, the assembly comprising a plurality of guide tubes and a control cluster which itself comprises a plurality of control rods which are received in the guide tubes and a support for the control rods, the assembly comprising a helical spring for damping an impact of the support against an upper end piece of the assembly in an event of the control cluster falling during a shutdown of the nuclear reactor, comprising:

establishing a progression of speed of the control cluster after the impact of the support against the upper end piece;

establishing, based on the speed of the control cluster after the impact of the support against the upper end piece, a maximum longitudinal load for compression of the spring; and

establishing, based on the maximum longitudinal load for compression of the spring, at least a maximum shearing stress in the spring.

10. (New) The method according claim 9, wherein the maximum shearing stress (τ_{max}) is a shearing stress along a neutral axis of the spring.

11. (New) The method according to claim 9, wherein the maximum shearing stress is a shearing stress along an axis (F2) of the spring nearest a longitudinal center axis (A) thereof.

12. (New) The method according to claim 10, wherein the maximum shearing stress is a shearing stress along an axis (F2) of the spring nearest a longitudinal center axis (A) thereof.

13. (New) The method according to claim 9, further comprising:

verifying, using the maximum shearing stress in the spring, that a maximum stress admissible by the spring has not been exceeded.

14. (New) A system for designing a nuclear fuel assembly, comprising:

a first arrangement configured to establish a progression of speed of a control cluster after an impact of a support against an upper end piece;

a second arrangement configured to establish, based on the speed of the control cluster, a maximum longitudinal load for compression of a spring; and

a third arrangement configured to establish, based on the maximum longitudinal load for compression, at least a maximum shearing stress in the spring.

15. (New) The system according to claim 14, further comprising:

a computer; and

a storage arrangement configured to store at least a program comprising instructions for performing steps of designing a nuclear fuel assembly.

16. (New) An article of manufacture comprising:

an arrangement configured to establish a progression of speed of the control cluster after the impact of the support against the upper end piece, establish based on the speed of the control cluster, a maximum longitudinal load for compression of the spring; and establish, based on the maximum longitudinal load for compression, at least a maximum shearing stress in the spring the article of manufacture configured to be read by a computer.